

White light interferometry on 3D opal based photonic crystals

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White light interferometry in the time domain is a powerful technique that permits obtaining phase sensitive information from photonic crystals (PhCs)¹ which is not easily provided by optical characterisation methods like reflectance and transmittance. With this technique we have measured the phase delay introduced by 3D opal based PhCs along the Γ L direction in reciprocal space for different crystal configurations (lattice parameter and sample thickness).

From the phase delay, an effective refractive index as well as group velocity is extracted. In the energy region of the L-pseudogap we observe the development of a spectral interval with anomalous dispersion for the refractive index. The group velocity shows pronounced slowing down at the band edge and becomes superluminal in the photonic gap. The behaviour with crystal parameters is discussed.

The wide spectral range provided by the technique allows extending the study into the high energy region where higher order diffractions both by {111} planes and other families of planes take place.² Preliminary results in this spectral range are presented.

[1] M. Galli, *et. al*, *Phys. Rev. B*, **69**, 115107 (2004).

[2] J. F. Galisteo-López and C. López, *Rev. B*, **70**, 035108 (2004).